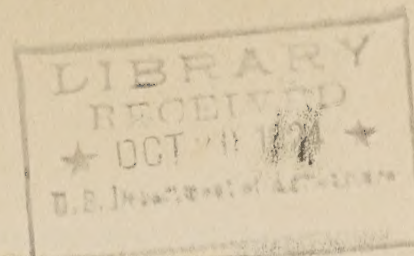


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REPORT OF KAIBAB DEER INVESTIGATING COMMITTEE
1924

233 Broadway
New York, Oct. 1, 1924.

Hon. Henry C. Wallace,
Secretary of Agriculture,
Washington, D. C.

Sir:

In January, 1924, you requested certain organizations interested nationally in wild life conservation and recreational problems to cooperate with you in investigating the conditions affecting the well-being of the deer herd in the Grand Canyon National Game Preserve, lying in northern Arizona.

In compliance therewith, the American Game Protective Association, the National Association of Audubon Societies, the Boone and Crockett Club, the National Parks Association, and the American National Livestock Breeders Association appointed representatives who undertook this task and the undersigned representing these organizations herewith submit their report as follows:

The Information Asked For

Under date of April 15, 1924, the Committee received from Colonel William B. Greeley, Forester of the National Forest Service of the United States Department of Agriculture, specific instructions as to the points it was desired we should consider and concerning which we were asked to report. These are here given:

"(1) A check on the estimates which we have used as to the total number of deer comprising the Kaibab herd and its rate of increase.

"(2) The size of the herd which can be maintained in a thrifty condition upon the amount of forage available and without danger of undue losses from starvation, in consideration of the local physical conditions and the frequent occurrence of seasons of limited rainfall.

"(3) To what extent can the safety of the herd be bettered by reducing grazing of domestic livestock; and would the Government be justified, in consideration of the needs of local settlers, in reducing the numbers of livestock beyond those now grazed by the Grand Canyon Cattle Company?

"(4) If the situation cannot be handled without a current reduction in the size of the deer herd, what should that reduction be and how can it most effectively be accomplished in consideration of maintaining the deer herd as one of the most valuable resources of the region?"

Itinerary

On the evening of August 16, 1924, the Committee entered the Grand Canyon National Game Preserve and went into camp at the Big Springs ranger station below the northwestern rim of the Kaibab Plateau. At this time and until the close of our investigations on August 26, we were assisted by S. B. Locke, Forest Examiner, U. S. Forest Service; Major E. A. Goldman of the U. S. Biological Survey; and Richard T. Evans of the U. S. Geological Survey.

On August 17 we proceeded on horseback from Big Springs in a general southwesterly direction for a few miles through a part of the yellow pine belt, crossed the western drift fence, and working slowly on in the same direction through areas of more or less scrub oak and locust on to the points of high land projecting to the west below the western rim of the plateau to about the upper limits of the pinion, juniper, and cliff rose country, returning in the late afternoon in a southwesterly direction to camp near the Indian Hollow cabin. The distance covered was about twenty-five miles.

During the days that followed, our work was continued, usually on horseback, over much of the western, southern, northern, eastern and central portions of the Preserve. These journeys took us through Indian Hollow, Quaking Asp Canyon, through the Big and Little Saddle regions, up Parishawampitts Canyon and out on Greenland Plateau. We studied the country from Bright Angel, through Little Park, V. T. Park, Pleasant Valley to Jacobs Lake and on to the desert to the north. At many places on the rim we reached points overlooking such places as Powell's Plateau, the Cocks Comb, Houserock Valley, and North Canyon. We thus traversed large numbers of typical regions of the Game Preserve, studying the condition of the trees and shrubs upon which the deer depend for browse and the grass, wherever any was found, which constitutes a very secondary source of deer food. We also observed the physical condition of the deer in all territories visited and made careful counts of the numbers of these animals seen.

On August 25 a hearing was held at Rust Hotel in V. T. Park where as result of previous advertisement various witnesses familiar with the region appeared before the Committee and were given an opportunity to express freely their opinions of the situation, criticisms of the management, and to make such suggestions as they desired.

Among those present who spoke on the subject were Stephen T. Mather, Director of the National Park Service; Bishop R. S. McAllister of Kanab, Utah; R. H. Rutledge, District Forester, Ogden, Utah; Mr. Drake, Manager

of the Grand Canyon Cattle Company; Richard T. Evans of the U. S. Geological Survey; Myron Hunt of Los Angeles, California; W. H. Mace, stockman, Kanab, Utah; John R. Finley, stockman, Kanab Utah; and J. H. Long, ex-Forest Ranger, Kanab, Utah.

Topographical Description

The Grand Canyon National Game Preserve, which largely covers the area of the Kaibab National Forest in northern Arizona, has for its backbone a rolling plateau varying in width from eight to sixteen miles and perhaps forty miles long from north to south. It has an average elevation of about 8,000 feet. At the north end the plateau drops by moderately steep slopes to an open desert valley, excepting where a ridge connects the lower slopes to the higher country in Utah across the valley. Along the eastern side it breaks abruptly leaving a high rim or wall of rock through which only occasional canyons afford a passage. From the foot of these breaks the surrounding low country rolls irregularly away to the eastward until it disappears into the flat and comparatively barren desert of the Houserock Valley neighborhood. The Grand Canyon of the Colorado River forms the southern boundary. On its western side the Plateau slopes much more gradually than on any other side, and is irregularly cut into by deep valleys which form between them points of high land.

The higher elevations of the Kaibab are covered with a forest of white and Douglas fir, Engelmann spruce, and aspen, while the slightly lower elevations support extensive areas of yellow pine through which is interspersed considerable locust, ceanothus, and varied shrubbery.

Here and there on the plateau are found narrow open grassy parks which usually are heavily bordered with aspen. The gradual slopes on the west support a mixed growth of aspen, scrub oak, juniper, pinion, cedar and cliff rose. On the north shore the slopes are less gradual, and on the east below the rim of the Kaibab Plateau the slopes support similar vegetation to the edges of the surrounding desert. There are no running streams in any part of the territory, the only source of water being twenty widely scattered springs of rather limited flow and a few tanks or pools which hold stagnant and polluted rainwater. The Grand Canyon National Game Preserve covers most of the territory described. At the south it meets the boundary of the Grand Canyon National Park at an average distance of about four miles from the Canyon rim.

Distribution of the Deer

The Kaibab Plateau formerly was a great Indian hunting ground and is known locally as Buckskin Mountain. It has long been famous for its great herd of mule deer, which fact was the occasion for making of it a National Game Preserve. In spite of the large areas apparently suitable for summer range the deer do not distribute themselves evenly throughout them. In some parts where the forage was comparatively good your committee found the deer in very small numbers, as for example in parts of the

at the Grand Canyon Hotel, Grand Canyon National Park, Arizona, U.S.A. The hotel is situated on the south rim of the canyon, and is one of the most beautiful hotels in the world. It is a large, modern hotel, with many comfortable rooms, and a fine dining room. The hotel is surrounded by the most beautiful scenery in the world, and is a most desirable place to stay. The hotel is open all year round, and is a most desirable place to stay.

THE GRAND CANYON NATIONAL PARK

The Grand Canyon National Park is a most beautiful and interesting place to visit. It is a large, deep canyon, with many beautiful views. The canyon is surrounded by the most beautiful scenery in the world, and is a most desirable place to stay. The park is open all year round, and is a most desirable place to stay. The park is a most beautiful and interesting place to visit. It is a large, deep canyon, with many beautiful views. The canyon is surrounded by the most beautiful scenery in the world, and is a most desirable place to stay. The park is open all year round, and is a most desirable place to stay.

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northern third of the Preserve and on Greenland Plateau, a long peninsula-like extension of the Kaibab at its southeastern corner. In other places where the forage was very heavily utilized deer were found in exceedingly large numbers. Especially was this true along the upper limits of the scrub oak belt and in the neighborhood of the open grassy parks, in spite of the excessive utilization of the forage there. Undesirable overconcentration in certain areas was most evident and easy of observation, but an explanation of this phenomenon is much more difficult.

Similarly, it is reported on good authority that the distribution of the deer on their winter range is equally uneven. Probably there is no general paramount reason or cause for this uneven distribution. It is more likely the result of a combination of several causes, and perhaps the explanation would differ with each locality under consideration. The conditions of forage, in the absence of other limiting factors, might very probably alone control the distribution of the deer on any range, but other causes undoubtedly contribute to produce the uneven distribution observed.

Some of these factors doubtless include extent of snowfall, cover, natural barriers, and last but not least, habit. The snowfall doubtless limits the winter range of the deer upon the slopes surrounding the Kaibab Plateau just as it is the principal cause of their seasonal migration or drift. Deer normally lie up during the day and the amount of cover available in any locality thus naturally tends to affect their distribution. Natural barriers such as precipitous rock walls or box canyons greatly affect the distribution on a given range by limiting their freedom of movement. This is probably one of the principal causes for the comparative scarcity of deer on the Greenland Plateau, which is a high plateau twelve or more miles long connected to the main Kaibab Plateau only by a narrow neck of about a mile in width and almost surrounded by precipitous rock walls. Difficulty of access, added to the fact that the Greenland Plateau projects far to the south of the general direction of the drift of deer (which is generally east and west) probably explains the relatively small numbers found there in spite of the comparatively good condition of its forage.

Another explanation may be found in their breeding habits. It may be that the does, on their return to the summer range, do not get beyond the central forest before they drop their young and that the inability of the fawns to travel results in holding the deer in this region.

It is a generally expressed belief that all animals are much controlled by habit from which deer are not excepted. They are for the most part gregarious and tend to remain together and to stay in a given locality unless compelled by natural or artificial causes to move elsewhere. Habit, therefore, tends to keep them in the locality of their birth or native haunts and, where there is a seasonal migration, it is habit which leads them back to the same haunts and causes them to remain there throughout the season.

An uneven distribution of foraging animals on a given range is not in itself objectionable, unless overconcentration develops. Where such a condition occurs not only will the forage supply be seriously reduced and the animals, therefore, impoverished, but a serious permanent damage to the range results. If such conditions are continued unchecked there is produced a permanent damage to the forage amounting ultimately to destruction of the range. A serious condition of overconcentration of deer in certain localities of this Preserve was very evident in the regions in the neighborhood of V. T. Park, along the lower slopes of the western side, and in the concentration areas of the east side. The forage of these localities has been destroyed to a most alarming extent, and should present conditions be allowed to continue much longer, serious permanent damage, if not destruction, will result to the range. This danger fully ranks in importance with the danger threatening the deer herd itself. The number of the deer in the Grand Canyon National Game Preserve and the methods and means of preserving a permanent herd in a thrifty condition has been made the principal consideration of this investigation; but the Committee believes that the danger now threatening the range conditions is at least equal and just as alarming as the danger threatening the existence or welfare of the deer herd.

Drift of the Deer

The term "drift" as applied to the deer is used in two ways: first, to denote the seasonal movement or migration from the winter to the summer range and vice versa; and second, to denote such permanent movement or migration of the deer off the Grand Canyon National Game Preserve, as a unit of range, to other adjacent, if not contiguous, independent ranges. The cause of the former is unquestionably the snow. Deer naturally prefer the higher altitudes and would most probably remain on the Kaibab Plateau proper throughout the year, were they not driven off by the approach of winter. A glance at the map will show that the summer range of deer in this Game Preserve is approximately oval-shaped with its long axis north and south. This area is surrounded by a belt of lower ground which is the winter range, but it is much wider on the sides, especially on the western, than on the northern and southern ends. Consequently, when the deer are forced off the high plateau by the approach of winter fewer can move to the narrow strips of winter range below the northern and southern ends than can pass to the larger areas of winter range on the two sides. This movement is the essential drift of the deer from or to the high plateau, the principal direction of which must therefore be east and west. Much of the Committee's time and attention was devoted to the study of possibilities for creating an overflow of the surplus deer from the Kaibab Forest to surrounding country, thus accelerating the very small permanent drift of the deer from the Preserve. If such a drift could be developed in a large way it would be a most effective natural remedy for the existing unfortunate conditions, and at the same time provide for the restocking with deer any available adjacent areas.

Unfortunately no such permanent drift in any appreciable numbers exists nor can it be expected. In several directions it is prevented by natural barriers. The borders of the northern and northwestern winter range melt sharply into the desert across which the deer will not drift, both on account of the desert and because there is no suitable range which could be reached by any movement in this direction. On the south the Canyon of the Colorado River forms an almost impassable natural barrier. There is just a possibility that a comparatively small number might be herded south from the Preserve to the south rim of the Grand Canyon National Park. We recommend that such a drive by rangers be attempted in the event that the Grand Canyon National Park provides watering places for the deer which we understand are not now available. There are two routes over which a very small permanent drift apparently takes place. One is the northeast by way of the low ridge connecting the slopes below the northeast corner of the Kaibab Plateau with the higher country of Utah across the valley. Suffering from severe shortage of food comparatively small numbers of the deer may follow this timbered ridge to the Red Bluff Mountains in Utah. This drift, however, is almost wholly prevented by shooting on the areas immediately north of the Preserve, and by the further fact that the territory is heavily grazed by sheep. Considerable shooting just outside the limits of the Grand Canyon National Game Preserve, both in and out of season in Arizona and Utah, was reported by several of the local residents who testified at the conference held by this Committee at V. T. Park.

The other route for a possible permanent drift is westward toward Mount Trumbull. The winter range on the western side of Kanab Creek Canyon, which forms part of the western boundary of the Kaibab National Forest, leads to the country surrounding Mount Trumbull. The forage conditions there are reported to be exceedingly bad, due to the large number of horses grazing on and around Mount Trumbull, and the natural barrier of Kanab Creek Canyon prevents all but the smallest movement in this direction. Excepting for the insignificant permanent drift of deer from it we may consider the Grand Canyon National Forest and the northern region of the Grand Canyon National Park as a naturally confined range. Wherever such natural or artificial confinement exists on any range it is self-evident that the number of animals subsisting on it will in the course of time increase up to and even beyond the limit which the food supply will support in a thrifty condition unless their increase be checked either naturally or artificially. The natural checks on the excessive increase of the deer, such as predatory animals (mountain lions, wolves, coyotes, and bobcats), have been much reduced. It is certain that the number of deer must eventually increase far beyond the limit of adequate food supply. It is the belief of this Committee that they have already done so and that only the adoption of artificial checks upon their further or excessive increase, can reduce them to the numbers which the range can properly support in a thrifty condition.

Condition of the Deer

Immediately upon entering the Grand Canyon National Game Preserve all members of the Committee were much impressed by the great abundance of deer.

In the course of a day's ride it was common to count above 100, which evidenced their great abundance considering the fact that during several hours in the heat of the day the deer ordinarily seek rest in quiet places. In the area of greatest summer concentration in and around V. T. Park one member of the Committee counted 1,028 in a drive of one hour and ten minutes along the highway, between the rim and lower end of V. T. Park.

In the regions covered during the first five days in the Game Preserve almost all the deer observed were in very poor condition. At that time of year, when the deer should be in the pink of condition, all, including even most of the large bucks, were extremely thin. In nearly every case the outline of the ribs could be easily seen through the skin. Many does with fawns were in a deplorable condition. In many cases hollows along the flanks and about the hip-joints were very noticeable. Some dead deer were found but whether they had died of starvation or were killed by predatory animals we were unable to determine. In considering the condition of the deer it must not be overlooked that this season has been one of severe drought, which would naturally affect the food supply. However, this drought was in no large way responsible for the vast scarcity of food over most of the Preserve. Members of the Committee visited the Dixie National Forest, and the Fish Lake National Forest, both in the same general section of the country and where forest growth and drought conditions were approximately identical, and found abundant food for deer. The ranges in these forests have not been overtaxed and the cattle and deer appeared to be in good condition. The proper number of any animals supported by a given range is, or should be, limited by the number which can be maintained in a thrifty condition during a lean year rather than during years of plenty.

Number of Deer

In former reports it has been estimated that the annual fawn crop is at least 100 per cent of the non-antlered deer (i.e. 50% of the total of the herd), that twin fawns are in a considerable majority, and that the number of bucks and does are about equal. The Committee believes that these estimates are fairly accurate.

Estimates of the number of deer in the Preserve made by forest officers and the Biological Survey in 1923 place the number at 20,000 with an annual increase which at that time had reached the rate of from 5000 to 8000. Assuming that the annual fawn crop equals approximately 50% of the total of the herd, or about 12,000, it is probably a conservative estimate which assumes that one-half of the fawns survive. The number of does observed without fawns was small and those having only one may have lost the second, a prey to predatory animals, or through inability to nourish more than one successfully. The Committee believes that the former official estimates of 20,000 with the above mentioned ratio of increase, which would bring the number up to 26,000 this year, are conservative and they may far exceed this number. All the local witnesses examined placed the number of deer in the Kaibab Forest at not less than 50,000.

Livestock

When the Grand Canyon Forest Preserve was created in 1906 the land contained within its boundaries had long been used as an open range by the stockmen of Arizona and Utah, and at that time 15,000 head of cattle and horses and 8,000 sheep and goats were permitted by license in the Forest. By progressive reductions the number of stock permitted has been gradually reduced, so that in 1924 the total number for which permits were issued make provision for 5,400 cattle and 3,650 sheep, but actually a much smaller number used the range. The Preserve is divided by fences into several sections and the permits issued are for grazing rights in specific sections. Permits for the grazing of cattle on the Preserve generally are for the year round, but those for sheep are for the summer season only, and limited to the north end. Besides the authorized livestock there are several hundred head of wild, unbranded or unpermitted horses living within the Preserve through the year. There is considerable difficulty attached to the removal of these, due not only to their wild nature but also to the fact that branded horses run with them, and the killing of branded animals might lead to difficulties. Of the domestic livestock for which grazing permits have been issued this year 60% are cattle and horses and 40% sheep.

Since the extent to which livestock and deer compete with each other for the available food supply is a determining factor in establishing the proper balance between their respective numbers, an intelligent study of their grazing habits is necessary for an understanding of the question. When a varied food supply is abundant, animals will naturally select only the more palatable or their favorite varieties and leave the less desirable. As their favorite diet is reduced they will feed more and more upon less desirable or less palatable types of forage. This use of the least desirable food may be termed the marginal utility of the range for the animal in question. Cattle and horses are grazers, and when the supply of grass is sufficient to satisfy their needs they seldom browse. When such stock is found browsing it is evidence that their natural food is insufficient for their needs and that they are beginning to feed on the marginal varieties of forage. Evidences of their browsing can in most instances easily be distinguished from the browsing of the smaller animals like sheep and deer. They bite or break off much larger shoots and twigs. It is natural for sheep both to graze and to browse, in fact their diet is much more varied and extensive than that of cattle, horses, or deer. Deer are largely browsers. Their natural diet is composed of the leaves, twigs and tender shoots of trees and shrubs. The grazing which they do when their normal food supply is abundant is limited to certain tender weeds and grasses in the spring and to a few of the more palatable plants like clover. Consequently when mule deer are found grazing on a grassy range to any great extent, it may be taken as evidence that the supply of browse available is not sufficient for their needs.

Under normal conditions of food supply the competition of cattle and horses with deer should be negligible for, if there was sufficient grazing, the horses and cattle would scarcely touch the browse and, if

there was sufficient browse, the deer would not eat the grass extensively. As between sheep and deer competition is probably at all times much more direct. The existing condition of forage is abnormal. Whatever the cause, there can be no question that the Grand Canyon National Game Preserve is now both overgrazed and overbrowsed. Sheep are now grazed only in a small part of the northern edge of the Forest, and the numbers of the cattle having been greatly reduced it is clear that the deer are the chief factors in this decrease of the food supply. The immediate withdrawal of all livestock from the Forest would not help the ultimate situation as regards the deer, because it would only postpone temporarily their inevitable starvation, which was freely predicted to us if excessive increase is not checked.

The Committee believes that under normal conditions several thousand head of domestic livestock could be allowed to graze in the Preserve without any injury to the range and without seriously competing with the deer for their food. A return to such normal conditions of forage on this range can be fully assured only by (1) the temporary removal of all livestock for such a period as the complete recuperation of the range may require, and by (2) the reduction of the deer herd to 50% of its present numbers for the same period. This range recuperation should be the first consideration of any policy of administration for this Preserve, and will doubtless require several years. Afterwards, when normal conditions of forage exist again on the Kaibab, it will be a simple matter for the Forest Service to limit the grazing of domestic livestock to proper numbers and to keep the size of the deer herd well within the limit of the food supply. Only by such a policy can the continuation or the recurrence of the present deplorable conditions be avoided.

Forage Conditions

In any consideration or investigation of the conditions of forage in the Grand Canyon National Game Preserve it must be borne in mind that it is a region where, even under the most favorable conditions, the luxuriance of the vegetation does not compare with that found in wooded areas in the eastern states.

The snow-berry and dwarf ceanothus, both of which are found quite plentifully throughout the timbered areas on the plateau, show such a heavy utilization by the deer that their seasonal recuperation is the minimum and their growth severely stunted, in fact in innumerable places such growth has been in large measure destroyed. Locust is widely scattered throughout the Preserve from the upper yellow pine belt to the lower limits of the scrub oak.

Aspen, which is a favorite forage of the deer in summer, grows profusely on the higher elevations, and scrub oak brush in considerable abundance forms a wide belt between the upper plateau and the winter range. Even under the most favorable conditions this supply of browse cannot be restored for many years. The locust, aspen, and oak trees have been denuded of their lower foliage as high as a large buck can reach and the

lower producing shoots and limbs have died as a result. Seedlings are cropped as soon as their growth appears above the surface of the ground. No young aspen trees under several years of age were seen on the entire trip through the Preserve and all such trees, the tops of which were not above the reach of deer, were killed. No reproduction can be expected under such conditions of excessive utilization.

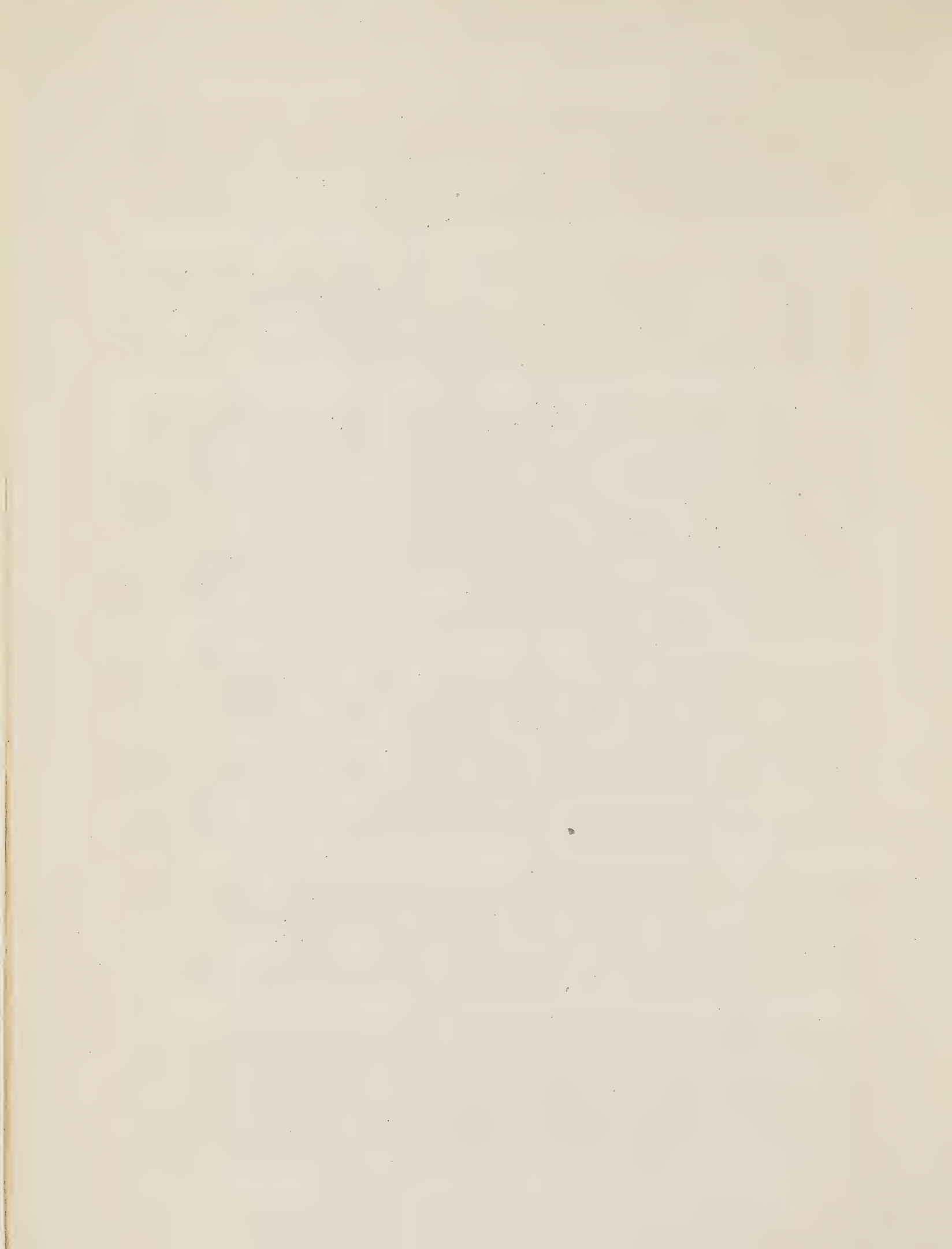
White fir is fairly plentiful on the higher parts of the plateau and, although it is commonly eaten by deer only under the stress of winter food shortage, showed the effects of recent heavy utilization. Wherever this type was found the young seedlings had been heavily browsed. This was done principally while the shoots were fresh and tender. A considerable stunting of their growth was evident.

The possible growth of grass is chiefly in V. T. Park and a few other similar glades. There might well be a considerable abundance of grass throughout the open spaces in the Forest under normal conditions. It has been so severely overgrazed that today no really good growth can be found anywhere. In V. T. Park it is scarcely over half an inch high. As compared with the utilization of the browse by deer there is much less evidence of their utilization of the grasses. Observations at several places indicated that the deer were not feeding on grass. Clover is a favorite food as is evidenced by the fact that at evening the deer enter the grassy parts in great numbers and often spend the entire night grazing on the short, scanty clover and on various weeds.

Many deer have already this year been forced over the edges of the plateau to the upper winter ranges and have quite generally defoliated the deciduous browse within their reach. The oak areas mentioned by Mr. Hal G. Evarts in his report as a possible future source of food supply have already been severely utilized. In the chief centers of winter concentration, the cedar and buck brush, which form the main source of winter food, show the same conditions of extreme overbrowsing as were observed on the higher range, so that unless drastic remedies be adopted immediately it is inevitable that the available winter food supply will soon be exhausted.

The cliff rose or buck-bush, which is also one of the main winter feeds, grows along the rims and flat points from the lower limit of the yellow pine to below the pinion and juniper. It is much more extensive on the west side than on the east. Its excessive utilization is everywhere most noticeable, for not only have the lower shoots been heavily cropped, but a great deal of breaking down of the bushes was observed.

It looked as if where animals could not reach the tops they had in some way managed to break down the bush in much the same way that moose will ride down small trees. This is killing the brush with a consequent severe loss in winter food supply. On account of the drought this season the new green shoots which are annually grown average only about three or four inches in length, whereas the usual seasonal growth should be over six inches. In general the conditions on the winter range were exceedingly bad.



The conditions of forage throughout the Preserve can only be characterized as deplorable, in fact they were the worst that any member of the Committee had ever seen. When not only the leaves but the annual growth of trees, bushes, shrubs, and grass are so closely cropped that seeding is impossible the condition of the range moves swiftly towards utter destruction.

As the food supply of the deer is reduced large numbers of them will be removed by Nature either through starvation or the ravages of some pestilence which attacks them in their weakened condition. Nature in this way will reduce the numbers to an infinitesimal breeding stock and provide for a period of recuperation. The injury to the range by allowing Nature to adopt such severe measures would virtually be permanent. The continued prevention of normal annual reproduction through seeding will in time eliminate from the range one type of forage after another. The least hardy grasses or shrubs will disappear first. A progressive denudation of the range increases the rapidity with which water runs off and the amount of top soil that is carried away with it. This is the type of permanent range destruction which the existing conditions in the Grand Canyon National Game Preserve acutely threaten. Actual starvation of the deer herd is not necessary to prove that overutilization is rapidly destroying the range.

Recommendations

The recommendations of this Committee are made solely for the purpose (1) of preserving the Kaibab deer herd for all time with the maximum number of deer that the area will support, and (2) of providing certain remedial measures in the existing emergency so that the range may recuperate. We are convinced that immediate action to reduce the deer herd is dictated by every principle of wisdom and that every precaution possible should be taken to restore the range in the Forest to normal conditions.

Livestock

If the range in the Grand Canyon Game Preserve was not seriously endangered by several years of most severe overutilization of the forage the question would not be whether the grazing of livestock should or should not be permitted but what total number should be permitted and the proportions of each kind. Doubtless any arbitrary removal of all of the livestock from the Forest would not be warranted. It must not be forgotten that the National Forests include huge tracts of Federal domain set aside for the primary purpose of conserving or perpetuating our natural resources.

The administration of these lands by the Agricultural Department through the Forest Service must be and is based upon sound economic principles or there would be no justification for such Preserves. The Service should, therefore, maintain a just balance in the use and development of all of the resources of this Game Preserve, including, besides the game, timber and grazing, and should not develop one resource to the exclusion

of all others. In view of the existing emergency, however, we recommend that all stock should at once be removed from the Forest, excepting the stock belonging to local settlers. The limited population of southern Utah is dependent largely upon the stock for a livelihood and we have not the heart to recommend that the small cattle owner be entirely eliminated.

We have requested the Grand Canyon Cattle Company to anticipate the Forest Service order and to remove the remnant of their cattle at once. We recommend that V. T. Park and its immediate surroundings be fenced to keep cattle out and be permanently reserved for deer only. When, after a period of recuperation of the range the Forest Service may find that additional livestock can be supported, it will then be a question of what is the reasonable or proper number of the total stock grazing on the Forest and what ratio should be maintained between the number of such stock and the maximum herd of deer that the range can support. Until this restoration of the range be an accomplished fact, we recommend that no new grazing permits be issued and that no existing permits be in any way increased.

Reduction of the Deer Herd

No one has attempted to deny that the present deer herd in the Grand Canyon National Game Preserve is much greater than the range can support in a thrifty condition. The observations of the Committee during their investigation, as well as the testimony of the witnesses who appeared at the conference held at V. T. Park, put this question beyond all possible doubt. How large a deer herd the Preserve could support, if the range were restored to a healthy condition must remain a matter of conjecture. It is not a material consideration for this investigation. When the range conditions have been restored it will be a comparatively easy matter for the authorities charged with the administration of the Preserve to determine what the proper size of the herd should then be.

Any reduction at this time must be made not only for the purpose of reducing it to such size as the range can support in its present depleted condition, but with a view to a reduction beyond what the range can now support, so that some measure of recuperation in the conditions of forage may take place. The Committee believes that as an immediate remedy for the present situation no reduction of less than 50% of the existing deer herd would be effective. We, therefore, recommend that one-half of the existing herd be removed and that this removal be accomplished as quickly as possible.

Shipping Deer Alive

The Committee is of one mind in the belief that the proper and logical method to be followed in reducing the Kaibab deer herd is to ship the deer alive to other localities. By this means other areas where deer are not native or from which they have been exterminated may be restocked. In certain places in the Kaibab Preserve it should be a comparatively easy matter to trap deer in considerable numbers. These could then be crated and shipped to other forests, preserves, parks, or private estates, where

conditions are suitable for their propagation and where proper care would be given them. We recommend that the Forest Service give deer for restocking without charge to any Federal Bureaus, State Game Commissions, Game Protective Associations, or to any individuals who will bear the expense of the capture, crating and transportation of the deer to the railroad.

Shooting

If this method of reducing the deer herd, by removing them alive, should not prove productive of the necessary reduction, we recommend that the Preserve be opened to hunting under careful regulations to be prescribed by the Secretary of Agriculture. We believe the Forest Service is in a peculiarly advantageous position for the handling of the hunting in a thoroughly sane and proper manner, and we further recommend that such hunting as may be necessary in the reduction of the deer herd shall be carried out along the lines of modern and approved principles of Game Management.

In the event that the Preserve should be opened to hunting one important practical difficulty in the administration and management of the hunting would be the price charged by the State of Arizona for a non-resident hunter's license. In many states there are reciprocal license fees at low cost. Such a reciprocal arrangement on the part of the State of Arizona would obviate this difficulty.

Game Management

For an intelligent understanding of the general principles of Game Management and of their application to the Grand Canyon Game Preserve a brief review of the history of our game and of our efforts for its conservation is essential. When this continent was being settled game of many kinds was found in vast abundance. Amidst this profusion of wild life the early settlers saw no reason for the application of any principles of conservation - for to them the supply seemed inexhaustible. Also, many considered any limitation on the killing of game as an unwarranted restriction of their liberties. Unrestricted shooting was everywhere customary. This abuse in time resulted in the extermination of certain species within given territories. The game was steadily driven to the mountains and swamps and was annihilated as much by the settling of the country as by the rifle.

When the people began to realize the danger of complete annihilation of our game, recourse was had to restrictive legislation. All laws enacted for a time were of a negative or prohibitive character. Game laws were based on the principle that conservation was best accomplished by arbitrary limitation of the seasons and bags and by closed seasons. Such laws were adopted in practically all of the states and territories as the country developed, but in spite of them our game continued to decrease with rapidity. Now, after some centuries of game protection based on such negative and arbitrary restrictions, modern conservationists are beginning to appreciate the failure of their principle. They are beginning

to realize that the stopping of killing is not the only, nor even the most effective way to conserve our game. Statutory restrictions of seasons and bags lack the elasticity which is required by constantly varying conditions. Limitations that are too generous one year may be too severe a few years later or vice versa, and the slow process of legislative enactment will not solve the problem.

Game Management is the scientific balancing of all that concerns the numbers and welfare of game on a given area. It includes not merely the limitation of seasons and bags but also such matters as the food supply, the distribution, the ratio of sexes, the maintenance of an adequate breeding stock, the absolute number that should be removed annually, the control of predatory animals, the places where game may or may not be shot, and preeminently the creation and maintenance of game preserves. Such a comprehensive scheme is a matter of positive administration and not merely a question of negative restrictions.

Almost everything which concerns the abundance and the welfare of game is variable. Not only does the weather seriously affect their food supply and breeding conditions but the nature of the country may change with great rapidity within a very short period of time. The weather alone, even where there is no shooting, can reduce the stock of game in a given area in one season from abundance to comparative scarcity by interfering with the normal reproduction during the breeding season or by injury to the food supply through serious drought or by heavy rain or snowfall. Conversely, favorable conditions of weather alone may change scarcity into abundance. When a country is settled, the building of fences and cultivation of the land will drive away or greatly reduce the number of large game thereon. Where game animals are dependent upon different ranges for winter and summer, the occupation of one or the other of those ranges will suffice to exterminate them.

Other factors affecting the number of game in any given area are the change from an agricultural to an industrial community, the clearing of lands which have been used as cover, the drainage of lakes or marshes which may be the special haunts of certain species, in fact any of various influences which inevitably follow the advance of civilization may have their effect. Shooting is only one of the factors affecting the conditions of game and is very often one of the least important. An arbitrary or inflexible statutory limitation can evidently not suit varying conditions.

The scientific management of game by a special authority such as a commission should have the power to change regulations from year to year in order to meet the changes in the local situation. The special authority charged with Game Management should have sufficiently elastic powers to control not only the open seasons, the shooting areas, the refuges, and the bag limits, but also the absolute numbers which may be killed in any given locality each season. Upon such principle of Game Management does the future of much of our wild life depend. The fundamental purpose and principle of Game Management is the maintenance upon a given area of the maximum breeding stock which that area will support in a thrifty condition.

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The excess over the maximum, which when well managed will amount to approximately the yearly increase, should be available for purposes of restocking elsewhere and for recreation and should be periodically removed to prevent an overstocking of the area.

Such a principle or system should be applied to the Grand Canyon National Game Preserve. It is, as we have shown, practically a confined area capable of supporting only a limited number of animals and is entirely under the jurisdiction of one Department of the Federal Government, viz., the Agricultural. The authority for the exercise of such Management exists, for the statute which created the Forest Service specifically grants to the Secretary of Agriculture all powers necessary in the exercise of such a system.

The Department of Agriculture is, the Committee believes, peculiarly suited to and especially efficient for the management or administration in such a matter. The Secretary can prescribe the areas in the Preserve where hunters may be allowed. This can be done with a view to limiting the number of deer to the proper maximum and to securing the proper distribution of them on the range. It can close or open permanently or temporarily any area to shooting and create refuges wherein game may not be disturbed.

As a result of improved roads, tourist travel through the Kaibab Forest is constantly increasing in volume, and already several thousand visitors annually derive pleasure from the sight of the deer grazing early in the day and toward evening in V. T. Park. This and other glades or natural meadows in the forest not only are the scenes of the greatest concentration of deer but are also on the direct travel route. The aesthetic value of the spectacle is of unique importance and no removal of deer should be permitted which would impair it. The Secretary, through the Forest Service, could also establish the open season in cooperation with the game officials of the State of Arizona, the absolute numbers that might be killed or removed in any year, and prescribe all rules and regulations by license for the sane and proper management of the game.

For instance, an absolutely closed season or any number of sanctuaries could be prescribed almost instantly by the mere issuance of new regulations by the Forest Service under the authority of the Secretary of Agriculture. Through an efficient licensing system abuses could be prevented by the immediate revocation of the hunter's license for violation of the Department's rules, or by refusing to issue a license to any hunter who had violated the regulations in any previous season. The licenses could also prescribe specifically in what areas the licensee might hunt. There are only seven springs in the areas where hunting might properly be allowed and consequently the camp grounds, which must be near water, would be easy of supervision. The Forest Service could even prescribe the place where any licensee might camp. The enforcement of the hunting regulations would be very simple through an adequate supervision of the few suitable camping grounds for hunters and a watch of the only two or three roads by which the Forest may be entered or left.

Such ideal conditions for the effective management and control of game could hardly be found anywhere. This Forest is a perfect unit for administration purposes. The efficiency of such a system would unquestionably produce results impossible of accomplishment by any other method. The maximum breeding stock that the range can support could be maintained or varied from year to year with almost mathematical precision. After a few years the number of deer on the Preserve could be controlled with as much ease as the number of cattle that are kept in any pasture. The proper number of deer could be increased or decreased each year in proportion to the conditions of the forage. Not only could the numbers be controlled, but the distribution on the range could be made even, thereby assuring a more equal utilization of all the forage. Besides improving the general welfare of the deer such a system of Game Management would allow the recuperation of the range from its present alarming condition.

Official Killing

If the two methods suggested above should prove inadequate for the ends desired, it may be necessary for the Government officially to destroy many of the deer, utilizing the meat and hides to the best available economic advantage, although we see many practical difficulties in the way of carrying out such a policy. For example, the various state laws which prohibit the sale of venison; the limited demands for venison; the difficulty in getting it to market in salable condition, and the expense involved in such an undertaking.

The Committee firmly believes that the official killing of game when not absolutely required by the failure of other methods is contrary to all existing principles and theories of American Game Conservation and would not recommend the adoption of such a plan except as a last resort.

Game Administration

The Committee recommends that whatever course the Government may take in its future handling of the Grand Canyon National Game Preserve there should be placed in charge of the territory a competent Game Administrator.

Respectfully submitted,

(Signed)

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